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Smartphone-Based Recognition of Human Activities and Postural Transitions Data Set

Download: Data Folder, Data Set Description

Abstract: Activity recognition data set built from the recordings of 30 subjects performing basic activities and postural transitions while carrying a waist-mounted smartphone with embedded inertial sensors.

Data Set Characteristics:	Multivariate, Time-Series	Number of Instances:	10929	Area:	Life
Attribute Characteristics:	Real	Number of Attributes:	561	Date Donated	2015-07-29
Associated Tasks:	Classification	Missing Values?	N/A	Number of Web Hits:	16353

Source:

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Data Set Information:

The experiments were carried out with a group of 30 volunteers within an age bracket of 19-48 years. They performed a protocol of activities composed of six basic activities: three static postures (standing, sitting, lying) and three dynamic activities (walking, walking downstairs and walking upstairs). The experiment also included postural transitions that occurred between the static postures. These are: stand-to-sit, sit-to-stand, sit-to-lie, lie-to-sit, stand-to-lie, and lie-to-stand. All the participants were wearing a smartphone (Samsung Galaxy S II) on the waist during the experiment execution. We captured 3-axial linear acceleration and 3-axial angular velocity at a constant rate of 50Hz using the embedded accelerometer and gyroscope of the device. The experiments were video-recorded to label the data manually. The obtained dataset was randomly partitioned into two sets, where 70% of the volunteers was selected for generating the training data and 30% the test data.

The sensor signals (accelerometer and gyroscope) were pre-processed by applying noise filters and then sampled in fixed-width sliding windows of 2.56 sec and 50% overlap (128 readings/window). The sensor acceleration signal, which has gravitational and body motion components, was separated using a Butterworth low-pass filter into body acceleration and gravity. The gravitational force is assumed to have only low frequency components, therefore a filter with 0.3 Hz cutoff frequency was used. From each window, a vector of 561 features was obtained by calculating variables from the time and frequency domain. See 'features_info.txt' for more details.

This dataset is an updated version of the UCI Human Activity Recognition Using smartphones Dataset that can be found at: [Web Link]
This version provides the original raw inertial signals from the smartphone sensors, instead of the ones pre-processed into windows which were provided in version 1. This change was done in order to be able to make online tests with the raw data. Moreover, the activity labels were updated in order to include postural transitions that were not part of the previous version of the dataset.

Attribute Information:

The dataset is then divided in two parts and they can be used separately.

1. Inertial sensor data
- Raw triaxial signals from the accelerometer and gyroscope of all the trials with with participants.
- The labels of all the performed activities.

2. Records of activity windows. Each one composed of:
- A 561-feature vector with time and frequency domain variables.
- Its associated activity label.
- An identifier of the subject who carried out the experiment.

The dataset includes the following files:
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- 'README.txt'

- '[Web Link]': The raw triaxial acceleration signal for the experiment number XX and associated to the user number YY. Every row is one acceleration sample (three axis) captured at a frequency of 50Hz.

- '[Web Link]': The raw triaxial angular speed signal for the experiment number XX and associated to the user number YY. Every row is one angular velocity sample (three axis) captured at a frequency of 50Hz.

- '[Web Link]': include all the activity labels available for the dataset (1 per row).
Column 1: experiment number ID,
Column 2: user number ID,
Column 3: activity number ID
Column 4: Label start point (in number of signal log samples (recorded at 50Hz))
Column 5: Label end point (in number of signal log samples)

- 'features_info.txt': Shows information about the variables used on the feature vector.

- 'features.txt': List of all features.

- 'activity_labels.txt': Links the activity ID with their activity name.

- '[Web Link]': Training set.

- '[Web Link]': Training labels.

- '[Web Link]': Test set.

- '[Web Link]': Test labels.

- '[Web Link]': Each row identifies the subject who performed the activity for each window sample. Its range is from 1 to 30.

- '[Web Link]': Each row identifies the subject who performed the activity for each window sample. Its range is from 1 to 30.

Notes:
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- Features are normalized and bounded within [-1,1].
- Each feature vector is a row on the 'X' and 'y' files.
- The units used for the accelerations (total and body) are 'g's (gravity of earth -> 9.80665 m/seg2).
- The gyroscope units are rad/seg.
- A video of the experiment including an example of the 6 recorded activities with one of the participants can be seen in the following link: [Web Link]

For more information about this dataset please contact har '@' smartlab.ws or check our website www.smartlab.ws

Relevant Papers:

- Jorge-Luis Reyes-Ortiz, Luca Oneto, Alessandro Ghio, Albert Samà, Davide Anguita and Xavier Parra. Human Activity Recognition on Smartphones With Awareness of Basic Activities and Postural Transitions. Artificial Neural Networks and Machine Learning â€" ICANN 2014. Lecture Notes in Computer Science. Springer. 2014.

- Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and Jorge L. Reyes-Ortiz. A Public Domain Dataset for Human Activity Recognition Using Smartphones. 21th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, ESANN 2013. Bruges, Belgium 24-26 April 2013.

- Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra, Jorge L. Reyes-Ortiz. Energy Efficient Smartphone-Based Activity Recognition using Fixed-Point Arithmetic. Journal of Universal Computer Science. Special Issue in Ambient Assisted Living: Home Care. Volume 19, Issue 9. May 2013

- Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and Jorge L. Reyes-Ortiz. Human Activity Recognition on Smartphones using a Multiclass Hardware-Friendly Support Vector Machine. 4th International Workshop of Ambient Assited Living, IWAAL 2012, Vitoria-Gasteiz, Spain, December 3-5, 2012. Proceedings. Lecture Notes in Computer Science 2012, pp 216-223.

- Jorge Luis Reyes-Ortiz, Alessandro Ghio, Xavier Parra-Llanas, Davide Anguita, Joan Cabestany, Andreu Català . Human Activity and Motion Disorder Recognition: Towards Smarter Interactive Cognitive Environments. 21th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, ESANN 2013. Bruges, Belgium 24-26 April 2013.

Citation Request:

- Jorge-L. Reyes-Ortiz, Luca Oneto, Albert Samà , Xavier Parra, Davide Anguita. Transition-Aware Human Activity Recognition Using Smartphones. Neurocomputing. Springer 2015.

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